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THE ROSCOE MANUAL

Volume 1-2: A Simplified ROSCOE Input Scheme

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The ROSCOE computer code is designed specifically to be the "laboratory standard" for evaluating nuclear effects on radar and optical sensors. The program provides a means for (1) evaluating radar acquisition, discrimination, and tracking performance in a nuclear environment; (2) determining optical (SWIR) effects; (3) measuring the degradation of microwave satellite communications systems due to transmission through nuclear disturbed regions; (4) estimating various radar and optical propagation error sources; and (5) computing specific phenomenological data.		

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20. (Continued)

The ROSCOE documentation consists of a number of volumes, including user manuals (Volumes 1 through 3), systems code descriptions (Volumes 4, 20, and 21-1), code validation documents (Volumes 6 and 23), and phenomenology code descriptions (all others). This document has been written as an extension to the user manuals. It describes a simplified input scheme for running a subset of ROSCOE problems. It is intended for the user who only occasionally runs the code or would like to run a small problem.

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1 INTRODUCTION

In the last few years, ROSCOE (Radar and Optical Systems Code with Nuclear Effects) has been expanded to include simulations of satellite communications and optical surveillance systems in a nuclear environment. This expansion has led to considerably more complexity in the input requirements.

While the ROSCOE input scheme was devised to handle these problems (with no additional coding) and to allow the user complete flexibility in structuring scenarios with multiple sensors, objects, and bursts, it takes some time to learn how to use the system. For the user who only occasionally runs the code, or would like to run a small problem, a new input scheme has been built for running a subset of ROSCOE problems with a simple set of inputs.

The next section describes this new input scheme. Example input sets are shown for several different types of problems and the program outputs are briefly discussed. Section 3 describes how to access the new scheme, for both batch and interactive jobs. Finally, to make this paper useful as a reference guide, tables which describe the input options have been placed in Appendix A.

2 DESCRIPTION

The new ROSCOE input scheme consists of a data deck with a pre-selected set of input options, and a data preprocessor program which inserts user-specified values for the options into the data deck. The scheme, in general, does not sacrifice any of ROSCOE's input versatility, since a new data deck with a different set of options can be generated without writing new code.

2.1 LIMITATIONS

With the new scheme, as currently set up, the user can run nuclear burst phenomenology problems alone, or nuclear effects on radar surveillance and tracking of ballistic missiles, satellite communication, or optical surveillance and tracking, subject to these constraints:

- Up to five bursts are allowed, at altitudes up to 400 km -- positions, times, and burst properties are input.
- Only one radar can be simulated in a run -- radar characteristics and location are input.
- Only one object trajectory can be simulated in a run (although multiple objects can be spaced in time on the trajectory) -- launch and impact points, impact time, and reentry angle are input.
- Only one satellite communication system can be simulated in a run (consisting of one ground transmitter, one ground receiver, and one set of satellite-borne equipment which receives and transmits) -- transmitter and receiver characteristics and locations are input.
- Only one optical sensor can be simulated in a run -- sensor characteristics and location are input.
- Run times can be no more than 900 seconds after the last burst.

2.2 INPUT VARIABLES

Input variables in the new scheme are of five types:

- General Inputs. Variables related to a reference location or time.
- Physics Inputs. Variables required to simulate a burst and print physics outputs.
- Radar Inputs. Variables required to simulate radar surveillance or tracking performance.
- Satcom Inputs. Variables required to simulate a satellite communication problem.
- Optics Inputs. Variables required to simulate optical sensor surveillance or tracking performance.

Table A.1 is a directory of input variables, divided into the five types described above with notes to indicate the options available. For each variable, the table gives its name, the number of values to be supplied (more than one if the variable is a vector), a definition of the variable including default units of measure, the default values that will be assumed if you do not input the variable, and whether a unit name is allowed for the variable. (Table A.2 shows the allowable unit names.) It is important to note the default units given. If you input values without unit names (for those variables allowing unit names), the default units are assumed. Note that the default values listed in Table A.2 are given in their customary units, which are not always the same as the internal default units.

To run a case, follow the instructions given in Table A.1, and input those variables you wish to change in the form: variable = value unit, variable = value unit, etc. End the input string with the command RUN following the last variable input. For vectors, the format may be: vector = value unit, value unit, etc., or vector(index) = value unit, value unit, etc. In the first case, the values are assigned to vector(1),

vector(2), etc.; in the second case, values are assigned to vector(index), vector(index + 1), etc. This free format is essentially compatible with the Fortran NAMELIST input scheme.

Note that positions can be specified by geographical coordinates (GEOGR), or by Cartesian (LOCXYZ) or range-azimuth-elevation (RADAR) coordinates relative to a reference location. The order of entry, orientation, and units for these specifications are given in Table A.3 and Fig. A.1.

2.3 EXAMPLE INPUT SETS

2.3.1 Physics Problem

To run a simple physics problem consisting of a single burst with the default characteristics and these assumptions:

- Burst time = 0 s
- Yield = 10 kT
- Altitude = 40 km
- Output every 20 s until 120 s after burst

input:

```
TSTOP = 120, OTIME = 0, OTINT = 20, BTIME1 = 0,  
BP0S1(3) = 40, YIELD1 = 10 KT, RUN
```

2.3.2 Radar Problem

To run a radar surveillance problem, where:

- There is a single burst with the above properties.
- The radar is at the center of a local Cartesian coordinate system (directly under the burst).
- The radar is of the type described by the default parameters.
- The object being viewed has a -30° reentry angle and is aimed at the radar.

- The object is at 100 km altitude at time = 0 when the burst occurs.
- Radar measurements are made once every second for 20 s.

input:

TST \emptyset P = 20, BTIME1 = 0, BP \emptyset S1(3) = 40, YIELD1 = 10 KT,
 \emptyset BTAG = OBJECT-1, \emptyset BTIM = 0, \emptyset BP \emptyset S(2) = 173,
100 KM, \emptyset BVEL(3) = -30, RADAR = REFER, RUN

2.3.3 Satcom Problem

To run a satellite communication problem, where:

- The ground transmitter and receiver are together, directly beneath a satellite at synchronous altitude (the default condition)
- The default link inputs are assumed
- The default nuclear burst (1 MT at 200 km altitude) occurs 10 s after the first communication
- The burst is displaced 200 km horizontally from the line of sight
- Communication calculations are made every 20 s, from 0 s to 100 s

input:

TST \emptyset P = 100, BTIME1 = 10, BP \emptyset S1(2) = 200, CTIME = 0,
CTINT = 20, RUN

2.3.4 Optics Problem

To run an optical sensor surveillance problem, where:

- There is a single burst of 10 kt at 40 km altitude
- The sensor is at synchronous altitude
- The sensor is pointed at the burst

- The sensor is of the type described by the default parameters
- Sensor calculations are made at only one time (0 s)

input:

```
TSTOP = 1, BTIME1 = 0, BP0S1(3) = 40, YIELD1 = 10 KT,  
0BTAG = REF-0BJECT, 0TYPE = SURVEILLANCE, 0L0OK = 0,  
REFPT(1) = 40, 0PTICS = REFER, RUN
```

2.4 OUTPUTS

The outputs produced by the ROSCOE code using the new input scheme are described in this section. Two types of outputs may be produced:
(1) printer plots, and (2) tabular outputs.

2.4.1 Printer Plots

When a high-altitude (>90 km) burst is simulated, the code produces a series of printer plots at times specified by the 0TIME, 0TINT input variables. The plots consist of a picture of the fireball and beta tube region and contour plots of mass density, electron density, and striation fraction in the high-altitude grid.

The contour plots of mass density and electron density represent vertical cross sections through the burst point in the (magnetic) north-south direction, viewed looking eastward. The contour plots of the striation fraction are cross sections normal to the earth's magnetic field, viewed looking down the field lines.

The plots are produced as they are computed internally, and thus will appear before the tabular output described below.

In addition, contour plots of the relative radiance at the focal plane of the sensor can be generated when the optics code is used. These plots are generated when the optics calculation type, OCAL , is set to FOV.

2.4.2 Tabular Outputs

There are seven phenomenology lists, five radar lists, two satellite-communication lists, and three optics lists that may be output at the conclusion of the run, depending on the type of simulation performed.

The phenomenology lists include: burst parameters, common fireball parameters (fireball set 1), two additional low-altitude fireball parameter lists (fireball set 2 and fireball set 3), additional high-altitude fireball parameters (fireball set 4), contained debris region parameters, and beta tube parameters.

The radar lists include: trajectory output, track measurement errors, track filter output, and two lists of propagation errors.

The satcom lists include: propagation and probability-of-error data, and satellite position coordinates with respect to the ground-terminal positions.

The optics output lists include: angle and signal-strength measurements for an optical tracking sensor application, the radiance along each path treated within the field-of-view, and the data stream output produced by a scanning sensor.

Table 1 shows a small sample of each type of output. Some of the column headings are self-explanatory, while others require additional comment.

TABLE 1
ROSCOE TABULAR OUTPUTS

PHENOMENOLOGY OUTPUTS

BURST PARAMETERS

TIME SEC	TOTAL RELEASE (TEGS)	BURST ENERGY (JEGS)	BURST ALTITUDE KM	BURST PT. INTENSITY (GM/CC)	SCALD HEIGHT KM	BURST PT. TEMP (DEG K)	INITIAL RADIIUS KM	TIME TO REACH 3000K TU WEACH 2000K
1020.000	.4111E+23	.2092E+23	250.000	.5045E+13	37.579	3937.792	212.560	0.000
1060.000	.4161E+23	.2092E+23	250.000	.5411E+12	67.922	13055.556	0.000	0.000

NOTE: Columns 9 and 10: The outputs "time to reach 3000 K and 2000 K" are used only for low-altitude (<90 km) fireball chemistry calculations.

FIREFALL SET-1

TIME SEC	FIREFALL TYPE NUMBER	HORIZONTAL RADIUS KM	VERTICAL RADIUS KM	REFINED ALTITUDE KM	RISE RATE KM	EXPANSION RATE KM	FIREFALL INTENSITY (RM/CC)	FIREFALL TEMP (DEG-K)
1030.000	1	280.513	269.073	421.568	1.671	0.000	3621E+12	11215.966
1050.000	1	280.513	426.172	475.551	1.471	0.000	3621E+12	8724.484

TIME SEC	FIREFALL TYPE NUMBER	HORIZONTAL RADIUS KM	VERTICAL RADIUS KM	REFINED ALTITUDE KM	RISE RATE KM	EXPANSION RATE KM	FIREFALL INTENSITY (RM/CC)	FIREFALL TEMP (DEG-K)
1030.000	1	164.274	690.061	713	0.000	286.533	269.073	0.000
1050.000	1	195.713	901.723	5.540	0.000	286.533	426.172	0.000

FIREFALL SET-2

TIME SEC	FIREFALL TYPE NUMBER	HORIZONTAL RADIUS KM	VERTICAL RADIUS KM	REFINED ALTITUDE KM	ROTATION DEG	ROTATION RADIAN	MAX VERTIX RADIIUS KM	VRT VERTIX RADIIUS KM	VERTIX VOLUME (CM ³)	CHARACT. TIP	CHARACT. SEC
1030.000	1	164.274	690.061	713	0.000	286.533	269.073	0.000	0.000	0.000	0.000
1050.000	1	195.713	901.723	5.540	0.000	426.172	0.000	0.000	0.000	0.000	0.000

NOTE: Column 6: Axis rotation is measured +CCW from North. Column 10: The characteristic time is the approximate time this fireball has merged with another (used only for low-altitude fireballs).

Table 1 (Continued)

FIREBALL SET-3						
TIME OF INPUT SEC	FIREBALL NUMBER	Y ₀ C ₀ RADIATE (CM)	Z ₀ C ₀ RADIATE (CM)	COMPL. RATE (CM ⁻¹)	IVAL (F CASSINI PARAMETER (CM))	IVAL (F CASSINI PARAMETER (CM))
95.000	1	-0.115E+09	-0.451E+09	0.421E+09	0.050	0.000
96.000	1	-0.115E+09	-0.451E+09	0.421E+09	0.411	0.000

NOTE: Column 6: The Oval of Cassini parameter describes the shape of a low-altitude fireball. A value of 1.0 or greater means the fireball has formed a torus. Columns 9 and 10: The fireball kind can take values from 1 to 5, where: 1 = skewed spheroid, 2 = spheroid, 3 = torus, 4 = inactive radiation-merged fireball, 5 = inactive hydromerged fireball.

FIREBALL SET-4						
TIME OF INPUT SEC	FIREBALL NUMBER	Y ₀ C ₀ RADIATE (CM)	Z ₀ C ₀ RADIATE (CM)	COMPL. RATE (CM ⁻¹)	GRID CELL INDEX (X=DIR.)	GRID CELL INDEX (Y=DIR.)
1630.000	1	-0.491E+09	-0.501E+09	0.501E+09	3	3
1640.000	1	-0.427E+09	-0.501E+09	0.501E+09	3	3

NOTE: Columns 6 to 8: The grid cell indices refer to the grid cell in which the fireball center is located.

DEBRIS PARAMETERS						
TIME OF INPUT SEC	FIREBALL NUMBER	DEBRIS NUMBER	TOTAL ENERGY (J=265)	DEBRIS ALTITUDE KM	MINIMUM RADIUS KM	LEWIS DISTANCE KM
95.000	1	1	0.834E+20	0.820	0.053	0.000
96.000	1	1	0.834E+20	0.804	0.070	0.000

NOTE: Column 8: The debris distribution parameter describes the rate of fall-off of the bolt source strength from the tube boundary (see RANC IV).

Table 1 (Continued)

BETA TUBE PARAMETERS						KINK-RADIUS			KINK-RADIUS		
Type	FILTRAL INPUT	RETARDED SHAPE	INITIAL DIP ANGLE	KINK-ANGLE FROM HORIZONTAL	KINK-PURST DISTANCE	AT 85KM	AT 60KM	AT 60KM	AT 60KM	AT 60KM	AT 60KM
CF INPUT	INCHES	DEG	DEG	DEG	KM	KM	KM	KM	KM	KM	KM
SEC											
1630.000	1	KINK	76.506	76.674	40.259	203.619	207.111	202.547	206.309		
1650.000	1	KINK	76.506	77.871	40.326	201.169	205.439	199.915	204.644		

NOTE: Column 3: The beta tube shape is either "STRAIGHT" or "KINK". Column 6: The kink-burst distance is the distance from the sub-burst point at 85 km to the center of the beta tube at 85 km.

RADAR OUTPUTS

RADAR OUTPUT						TIME-VELCITY			NUMBER OF TARGETS		
Type	First OF Output Sec	Position Altitude m	Data for range	Object at Azimuth deg	Specified Elevation deg	Time	Velocity m	Signal to Noise (dB)	Targets		
SEARCH	1519.497	910.669.377	32756.10.933	A1.274	2.722	6226.094	19.879		1		
VERIF	1519.597	910.669.377	32756.00.308	A1.275	2.775	6226.759	20.575		1		

NOTE: Column 1: The event type is either "SEARCH", "VERIFY", "TRACK IN" (for track initiation), or "TRACK". Columns 3 to 7: The position and velocity data given here are the actual values. Column 9: The number of targets can be zero if the target has been lost, one if a single target has been located, or more than one if multipath effects occur.

TRACK "F" SURVEYED ERGUNS

TRACK "F" SURVEYED ERGUNS						MEASURED ELEVATION			MEASURED ELEVATION		
Visit	Projective Range	Projected Azimuth deg	Measured Elevation deg	Range	Azimuth deg	Range	Azimuth deg	Elevation	Azimuth deg	Elevation	Azimuth deg
OF output	m	deg	m	m	deg	m	deg	m	deg	m	deg
1519.497	32756.07.0.933	A1.274	2.722	32756.10.359	81.182	2.604	81.574	0.000	0.000	0.000	0.000
1519.597	32756.00.308	A1.275	2.775	32756.01.211	81.182	2.604	81.574	0.000	0.000	0.000	0.000

NOTE: Columns 2 to 4 and 5 to 7: The predicted position is either equivalent to the actual position for search pulses or is the position predicted by the track filter once track has been initialized. The measured coordinates are those generated during the current look and include all refraction and radar measurement errors.

Table 1 (Continued)

TRACKING RESULTS									
TIME SEC	POSITION IN ALTITUDE M	POSITION IN DOPPLER V	POSITION IN AZIMUTH V	VELOCITIES ALONG V M	VELOCITIES ACROSS V M	VELOCITIES PEP TR. V M	CROSS V M	APPARENT HEIGHT M	TARGET AZIMUTH DEG
1616.997	512.146	1549.961	-57.792	1718.544	6084.306	-2792.826	31935.76.724	80.954	3.250
1617.007	512.060	513.467	1483.290	451.001	2212.609	366.810	3167482.417	80.938	3.260

NOTE: Columns 2 to 7 and 8 to 10: The errors in position and velocity are the difference between the filter prediction and actuals. The apparent target coordinates are the actual coordinates plus refraction and multipath errors before radar measurement errors have been added.

PROPAGATION INPUT - I									
TIME SEC	ABSORPTION FROM ALL SOURCES	REFLECTION FROM ALL MATERIALS	NCIR THRESHOLD	NOISE POWER	CLUTTER- TO-NOISE RATIO (DB)	DISPERSIVE LOSS	FARADAY ROTATION LOSS	FAILURE MODE	FAILURE MODE
1509.497	0.000	7.206	0.000	0.2445E-09	0.000	1.000	1.000	NO FAILURE	NO FAILURE
1509.597	0.000	7.5E3	0.000	0.2445E-09	0.000	1.000	1.000	NO FAILURE	NO FAILURE

NOTE: Column 9: The failure mode flag can have the following messages:

- NO FAILURE S/N received is above threshold
- RANGE The radar is range (power) limited for this target
- ABSORPTION The absorption due to all sources has reduced the S/N below threshold
- ABS-NOISE The combination of absorption and fireball noise has reduced the S/N below threshold
- TOTAL The combination of absorption, noise, dispersion, and Faraday rotation has dropped the S/N below threshold
- LOW SIGNAL The combination of the above effects and refraction or clutter has dropped the S/N below threshold
- NO TARGET There are no targets within the range gate and 3 dB beamwidth

Table 1 (Continued)

PROPAGATION OUTPUT -2					
TIME OF OUTPUT SEC	RANGE M	BIAS DEG	REFRACTION AZIMUTH DEG	ERRONEOUS ELEVATION DEG	RANDOM RANGE M
1500.497	0.000	0.000	0.000	0.000	0.000
1501.497	0.000	0.000	0.000	0.000	0.000
SATCOM OUTPUTS					

COMMUNICATIONS OUTPUT -1

TYPE OF OUTPUT SRC	TIME OF OUTPUT SRC	UPLINK LOSS FACTH	UPLINK SCINT	DOWNLINK LOSS FACTOR	DOWNLINK SCINT
CCW-EFCV0	1612.000	1.001	0°	1.615	0°
FCP-BTCV0	1622.000	22.403	9526.6	60.143	10230.

NOTE: Columns 3 to 6: The uplink and downlink loss factors are the losses due to absorption from all sources (dimensionless). The uplink and downlink scintillation values refer to the standard deviation in phase due to scintillation effects in radians.

COMMUNICATIONS OUTPUT -2

TIME OF OUTPUT SRC	SATELLITE RANGE M	COMBO RPT AZIMUTH DEG	TRANSMISSION ELEVATION DEG	SATELLITE RANGE M	CLOUD MFT AZIMUTH DEG	RECEIVED ELEVATION DEG
1612.000	1506.105	-90.892	74.592	1306.105	-96.892	74.592
1622.000	1291.663	-90.922	77.716	1291.663	-86.922	77.716

Table 1 (Continued)
OPTICS OUTPUT

OPTICAL PATHS		OPTICAL PATHS		OPTICAL PATHS		OPTICAL PATHS		OPTICAL PATHS	
Path	Central Azimuth (WAVEFRONT)	Actual Azimuth (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)
RF INPUT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SFC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NOTE: Actual, measured, and estimated coordinates are measured in angular units relative to the sensor boresight.									
INTEGRATED PATH DATA		INTEGRATED PATH DATA		INTEGRATED PATH DATA		INTEGRATED PATH DATA		INTEGRATED PATH DATA	
Path	Central Azimuth (WAVEFRONT)	Actual Azimuth (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)
RF INPUT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SFC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NOTE: The radiance in Column 5 is the integrated radiance along the path (described by the azimuth and elevation off-boresight) due to all emission and scattering sources. The integrated radiance in Column 6 is just radiance integrated over all band intervals and the signal due to structure (Column 7) is the deviation in the integrated radiance due to striated (or structured) regions along the path.									
OPTICAL SAMPLES		OPTICAL SAMPLES		OPTICAL SAMPLES		OPTICAL SAMPLES		OPTICAL SAMPLES	
Path	Central Azimuth (WAVEFRONT)	Actual Azimuth (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)	Actual Elevation (WAVEFRONT)	Central Elevation (WAVEFRONT)
RF INPUT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SFC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.0000	1.000	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
0.0000	1.000	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
0.0000	1.000	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999

NOTE: The last four columns show the scanned signal output (irradiance at the detector), the normalized signal output (the irradiance normalized to the sensor NFID), the final signal output (after all other processing such as differencing has been completed), and the target detection flag which signifies whether the final signal exceeds a preset threshold designating the point a "TARGET" versus a "BGND" point.

3 ACCESSING THE INPUT SCHEME

3.1 BATCH JOBS

To access and use the new input scheme in the batch mode (i.e., by submitting a card input deck over the counter or through a remote terminal), use a deck setup such as that shown in Table A.4.

Note that an optional card may precede the data cards, directing the input program to print each default card changed, followed by the new card which replaces it.

3.2 INTERACTIVE JOBS

To access and use the new input scheme using the time-share system follow these steps (also shown in Table A.6). (First, you must have a procedure permfile containing a small CYBER control language "PRØC" and a set of control cards. A sample procedure permfile is shown in Table A.5)

- Step 1. Access your procedure file with the ATTACH statement.
- Step 2. Execute the ROSCOE time-share program by typing RØSCØTS.
- Step 3. Type your inputs, in response to the program's message "INPUTS?". The program then processes the inputs; that is, inserts them into the standard deck and checks for errors. If errors occur, the program prints them and asks you to input a revised list by again asking "INPUTS?". When no errors occur, terminate RØSCØTS by typing "RUN". The job file is then automatically placed in the input queue, and control returns to the INTERCOM system. You can check that your job has been accepted by typing a FIND, nnn command, where nnn is the first 1-5 characters of the job name (first parameter on your first control card).

APPENDIX A

USER REFERENCE TABLES

DICTIONARY OF INPUT VARIABLES

INPUT VARIABLE	NO. VALUES	DESCRIPTION
		UNDEFINED

TABLE A.1
A DIRECTORY OF INPUT VARIABLES

	02/04/80 10.36.16.	PAGE 1
UNIT-NAME ALLOC	DEFALT VALUES	

SIMPLIFIED RCSCT INPUT LIST

A. GENERAL INPUTS

- THE DEFAULT VALUES ARE SET SO THAT THE CODE PROCESSES THE STOP EVENT FIRST AND THUS PROCESSES TO OUTPUT.
- TO RUN A PHYSICS ANALYSIS, SURFACE, OR OPTICS PROBLEMS, CHANGE THE EVENT TIMES DESCRIBED BELOW. TO OCCUR BEFORE THE STOP TIME.

	TSUP	TSTOP	REFALT	REFLON	REFLFL	REFLAT	EVNLST	ACELL	KREG	KVIS	WSM	DO	CCLSRS
	1	0.	1	1	1	1	1	1	1	1	1	0	0
REFALT			REFERENCE POSITION LAST LINE (FL)										NO
REFLON			REFERENCE POSITION LAST LINE (FL)										NC
REFLFL			REFERENCE POSITION NORTH LATITUDE (FL)										NC
REFLAT			REFERENCE POSITION NORTH LATITUDE (FL)										NO
EVNLST			FLAG TO SURFACE EVENT LIST OUTLINE UNITY (IF ZERO, A SINGLE										NO
			CUTOUT LINE IS PHARATIC FROM EJECT FUEL PROCESSING.										NO
			OUTPUT CELL SIZE (HIGH ALTITUDE (IN:OVE 50 KM) 0.01										NO
			METER = REGION TYPE FUEL CELL SIZE (LOW ALTITUDE, 2E-4, 3E-4, 1E-										NC
			METER = REGION TYPE FUEL CELL SIZE (LOW ALTITUDE, 2E-4, 3E-4, 1E-										NO
			5=10KM, 10=5KM, 50=1KM)										NO
			WSM = INDEX FOR CATEGORY OF SURFACE MATERIAL (1=ALUMINUM, 2=IRON,										NO
			3=STEEL, 4=BRASS, 5=LEAD, 6=CLADANI										NO
			7=LEAD, 8=ZINC, 9=CHROMIUM, 10=IRON, 11=NIQUEAN										NO
			12=IRON, 13=ZINC, 14=CHROMIUM, 15=NIQUEAN, 16=IRON, 17=ZINC, 18=CHROMIUM, 19=NIQUEAN, 20=IRON, 21=ZINC, 22=CHROMIUM, 23=NIQUEAN, 24=IRON, 25=ZINC, 26=CHROMIUM, 27=NIQUEAN, 28=IRON, 29=ZINC, 30=CHROMIUM, 31=NIQUEAN, 32=IRON, 33=ZINC, 34=CHROMIUM, 35=NIQUEAN, 36=IRON, 37=ZINC, 38=CHROMIUM, 39=NIQUEAN, 40=IRON, 41=ZINC, 42=CHROMIUM, 43=NIQUEAN, 44=IRON, 45=ZINC, 46=CHROMIUM, 47=NIQUEAN, 48=IRON, 49=ZINC, 50=CHROMIUM, 51=NIQUEAN, 52=IRON, 53=ZINC, 54=CHROMIUM, 55=NIQUEAN, 56=IRON, 57=ZINC, 58=CHROMIUM, 59=NIQUEAN, 60=IRON, 61=ZINC, 62=CHROMIUM, 63=NIQUEAN, 64=IRON, 65=ZINC, 66=CHROMIUM, 67=NIQUEAN, 68=IRON, 69=ZINC, 70=CHROMIUM, 71=NIQUEAN, 72=IRON, 73=ZINC, 74=CHROMIUM, 75=NIQUEAN, 76=IRON, 77=ZINC, 78=CHROMIUM, 79=NIQUEAN, 80=IRON, 81=ZINC, 82=CHROMIUM, 83=NIQUEAN, 84=IRON, 85=ZINC, 86=CHROMIUM, 87=NIQUEAN, 88=IRON, 89=ZINC, 90=CHROMIUM, 91=NIQUEAN, 92=IRON, 93=ZINC, 94=CHROMIUM, 95=NIQUEAN, 96=IRON, 97=ZINC, 98=CHROMIUM, 99=NIQUEAN, 100=IRON, 101=ZINC, 102=CHROMIUM, 103=NIQUEAN, 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DIRECTORY OF INPUT VARIABLES
Table A.1 (Continued)

DESCRIPTION

INPUT
NO.
VARIABLE
VALUES

1. RUN CONTROL

--THE COCE PROCESSES ONLY BURST PARAMETERS OUTPUT BY
ICEFALL. TO GET TIME STEPWISE ICEFALL AND CLOUDS
PROFILERS AT REGULAR INTERVALS, INPUT TIME1 AND
TIME2.

--FOR EXAMPLE--BY INPUTTING TIME1=0, SEC, TIME2=1, SEC
CLOUD=30, SEC, THE COCE WILL OUTPUT PHYSICS DATA
STARTING AT 1 SEC AFTER BURST AND CONTINUE EVERY 30
SEC TIL THE STOP TIME IS REACHED.

TIME
OTINT
1
1
0 TIME = PHYSICS OUTPUT TIME (ICEFALL UNIT IS SEC)
GTINT = PHYSICS OUTPUT DATA TIME INTERVAL (ICEFALL UNIT IS SEC)

2. BURST DATA

--UP TO FIVE BURSTS ARE ALLOWED.
--THE USER CAN CHOOSE TO TREAT BURST COORDINATES IN
GEOPOLITICAL COORDINATES (GLOBALLY) OR COORDINATES
RELATIVE TO THE REFERENCE LOCATION IN SECTION A. ABCVAL
LOCXYZ GM HADAM.

--FOR EXAMPLE--THE USER CAN INPUT BPOS1=0,0,50,50,LOCXYZ
AND BURST 1 IS SPECIFIC TO A CARTESIAN EAST-NORTH-UP
(XYZ) COORDINATE SYSTEM.

	BTIME1	BTIME2	BTIME3	BTIME4	BTIME5	BPOS1(1-4)	BPOS2	BPOS3	BPOS4	BPOS5	
1	BURST TIME FOR BURST 1 (EQUALLY UNIT IS SEC)	BURST TIME FOR BURST 2 (EQUALLY UNIT IS SEC)	BURST TIME FOR BURST 3 (EQUALLY UNIT IS SEC)	BURST TIME FOR BURST 4 (EQUALLY UNIT IS SEC)	BURST TIME FOR BURST 5 (EQUALLY UNIT IS SEC)	BURST COORDINATES FOR BURST 1. (COORDINATE1=LATITUDE (MM), BPOS1(1-4) = BURST COORDINATES FOR BURST 1. (COORDINATE1=AST LONGITUDE (DEG), X-COORDINATE, Y-COORDINATE). ON WAVEFRONT, BPOS1(1-4) = BURST COORDINATES FOR BURST 1. (COORDINATE1=AST LONGITUDE (DEG), X-COORDINATE, Y-COORDINATE). ON ELEVATION (CLIG). BPOS1(1-4) = BURST COORDINATES FOR BURST 2 (SEE BPCS1 DESCRIPTION)	0.	0.	0.	0.	0.
2	0.0	0.0	0.0	0.0	0.0	LOCKXYZ	LOCKXYZ	LOCKXYZ	LOCKXYZ	LOCKXYZ	
3	200.	200.	200.	200.	200.	0.	0.	0.	0.	0.	
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	

DIRECTORY OF INPUT VARIABLES
Table A.1 (Continued)

INPUT VARIABLE	NC. VALUES	DISCRIMIN.

02/04/60 10:36:18.
REFLUT
VALUES
0.
200.
LOCKITZ

		PAGE 3	UNIT-NAME ALLOCATED
YIELD1	= YIELD OF BURST 1 (LEFFAL UNIT IS MT)	1.0	MT
YIELD2	= YIELD OF BURST 2 (LEFFAL UNIT IS MT)	1.0	MT
YIELD3	= YIELD OF BURST 3 (LEFFAL UNIT IS MT)	1.0	MT
YIELD4	= YIELD OF BURST 4 (LEFFAL UNIT IS MT)	1.0	MT
YIELD5	= YIELD OF BURST 5 (LEFFAL UNIT IS MT)	1.0	MT
FFRAC1	= FISSIION FRACTION CF BURST 1	1.0	NO
FFRAC2	= FISSIION FRACTION CF BURST 2	1.0	NO
FFRAC3	= FISSIION FRACTION CF BURST 3	1.0	NO
FFRAC4	= FISSIION FRACTION CF BURST 4	1.0	NO
FFRAC5	= FISSIION FRACTION CF BURST 5	1.0	NO
NFFRAC1	= HYDRO FRACTION OF BURST 1	1.0	NO
NFFRAC2	= HYDRO FRACTION OF BURST 2	1.0	NO
NFFRAC3	= HYDRO FRACTION OF BURST 3	1.0	NO
NFFRAC4	= HYDRO FRACTION OF BURST 4	1.0	NO
NFFRAC5	= HYDRO FRACTION OF BURST 5	1.0	NO
XFRAC1	= X-RAY FRACTION OF BURST 1	1.0	NO
XFRAC2	= X-RAY FRACTION OF BURST 2	1.0	NO
XFRAC3	= X-RAY FRACTION OF BURST 3	1.0	NO
XFRAC4	= X-RAY FRACTION OF BURST 4	1.0	NO
XFRAC5	= X-RAY FRACTION OF BURST 5	1.0	NO
GFRAC1	= GAMMA FRACTION CF BURST 1	.001	NO
GFRAC2	= GAMMA FRACTION CF BURST 2	.001	NO
GFRAC3	= GAMMA FRACTION CF BURST 3	.001	NO
GFRAC4	= GAMMA FRACTION CF BURST 4	.001	NO
GFRAC5	= GAMMA FRACTION CF BURST 5	.001	NO
WMASS1	= ALAPCN MASS CF BURST 1 (ICEFAULT UNIT IS GM)	1.5E6	GM
WMASS2	= ALAPCN MASS CF BURST 2 (ICEFAULT UNIT IS GM)	1.5E6	GM
WMASS3	= ALAPCN MASS CF BURST 3 (ICEFAULT UNIT IS GM)	1.5E6	GM
WMASS4	= ALAPCN MASS CF BURST 4 (ICEFAULT UNIT IS GM)	1.5E6	GM
WMASS5	= ALAPCN MASS CF BURST 5 (ICEFAULT UNIT IS GM)	1.5E6	GM
XITEM1	= X-RAY TEMPERATURE (KEV) OF BURST 1 -- E.G. (0.5,1.0, 2.0)	1.0	NO

3. *EARTH DATA
---TC FIVE STATIC TRIPLE CNT PL ENTERED.
---X-RAY ITEM FRACTIONS ARE LIMITED TO THE THREE VALUES
LISTED.

DIRECTORY OF INPUT VARIABLES

Table A.1 (Continued)

1st UT

NC

VARIABLE

VALUES

				PAGE
				4
				UNIT NAME ALLC&ED
XITEM2	1	XITEM2 = X-HAY TEMPLAURE (NEV) OF BURST 2 -- (0.5,1.0, 0. CH 2.0)	1.0	NC
		IMSLT BE TYPE1 LITERALLY -- E.G. C.5 NOT .5)		
XITEM3	1	XITEM3 = X-HAY TEMPLAURE (NEV) OF BURST 3 -- (0.5,1.0, 0. CH 2.0)	1.0	NC
		IMSLT BE TYPE2 LITERALLY -- E.G. C.5 NOT .5)		
XITEM4	1	XITEM4 = X-HAY TEMPLAURE (NEV) OF BURST 4 -- (0.5,1.0, 0. CH 2.0)	1.0	NO
		IMSLT BE TYPE3 LITERALLY -- E.G. C.5 NOT .5)		
XITEM5	1	XITEM5 = X-HAY TEMPLAURE (NEV) OF BURST 5 -- (0.5,1.0, 0. CH 2.0)	1.0	NO
		IMSLT BE TYPE4 LITERALLY -- E.G. C.5 NOT .5)		

C. RADAR CODE INPUTS

--TC RUN A RADAR PROBLEM THE USER MUST FIRST SET
RADAR REFERER

--RADAR FACILITY CAN THEN BE SET UP IN TWO WAYS--
(1) AN OBJECT POSITION, VELOCITY AND TIME CAN BE INPUT
(SEE OBJECT DATA STATE VECTOR INPUT SECTION). ALL THE
FIRST RADAR LOCK WILL BE INITIATED AT THE OBJECT TIME
SPECIFIED.
(2) THE USER SPECIFIES AN OBJECT TRAJECTORY (SEE OBJECT
DATA - TRAJECTORY INPUT) AND THE FIRST RADAR LOCK IS
ESTABLISHED AT THE OBJECT ENTERS THE RADAR FGV.

1. RUN CONTROL

--IT DEFERENCE RADAR LOCKS OR CLOSED LCCP TRACK
IS SELECTED BY SETTING (KFLAG).

--CLOSEDLOCK ARE CREATED INTERNALLY EVENT (CT) SEC.

RADAR	1	KRADAR = FLAG FOR INITIALIZING RADAR PROCEDURE (SET RADAR REFERER FOR RADAR CALCULATIONS)	NO
KFLAG	1	KFLAG = FLAG FOR CLOSED LCCP TRACK (0=TRACK, 1=NO TRACK/SEARCH ONLY)	NO
DT	1	DT = RADAR LOCK (CH TRACK) INTERVAL (CFACULTY UNIT IS SEC)	YES

2. RADAR DATA

--THE RADAR LOCATION CAN BE INPUT IN GEOGRAPHICAL
COORDINATES (LAT/LON) OR RELATIVE TO THE REFERENCING
LOCATION IN SECTION A. ABOVE.
--FOR EXAMPLE-- THE DEFAULT VALUES FOR RADAR PLACE THE
RADAR AT THE ORIGIN OF THE CARTESIAN EAST-NORTH-UP

DIRECTORY OF INPUT VARIABLES
Table A.1 (Continued)
INPUT AC
VARIABLE VALUES

			02/04/80 10.36.18.	DEFAULT VALUES	PAGE 5
INITIAL EARTH-CENTERED COORDINATES					
ALL C.A.E.C.					
ROPOS	4	KPCSI(1-4) = RACAR POSITION (REFL(1-3)=POSITION CCW,REFC(1-4)=CCW FROM EAST, AND C.G. TRAILER, IN RAD. DISTANCES ARE IN KM. FIGLES IS C.G.)	0.	0.	
BORT	2	ECHE(1-2) = RADAR URGENT LINECTION (AZIMUTH CCW FROM EAST, AND ELEVATION, IN DEG)	90.	LOCXYZ	NC
FREQ	1	FRDG = RADAR FREQUENCY (RADIAN)	25.	MHZ	NC
ASDM	1	ASDM = RADAR RANGE (IN SAW) (REFCUM THE DEFAULT UNIT IS CPS/CM)	450.	KM/SEC	YES
SEAMW	1	SEAMW = RADAR ENVIRONMENT (RADAR) (REFCUM THE DEFAULT UNIT IS RADARS)	2500.		
RWAX	1	RWAX = MAXIMUM DETECTION RANGE (RADAR) (REFCUM THE DEFAULT UNIT IS CM)	1800.		
EWTI	1	EWTI = MAXIMUM ELEVATION ANGLE (RADAR) (REFCUM THE DEFAULT UNIT IS RADARS)	2.	CEG	YES
S10V	1	S10V = S/R THRESHOLD FOR DETECTION AND VERIFICATION (RADAR) (REFCUM THE DEFAULT UNIT IS RADARS)	20.	DB	YES
S1MIL	1	S1MIL = S/N THRESHOLD FOR TRACK (REFCUM THE DEFAULT UNIT IS PATIO/IMENSIONLESS)	15.	LB	YES
BRANCH	1	BRANCH = RADAR BANDWIDTH --OFFICE, 1.0/FIRST LENGTH (REFCUM THE DEFAULT UNIT IS M2)	2.5	KPZ	YES
BAUDS	1	BAUDS = SIGNAL BANDWIDTH --OFFICE, BAUDOF (REFCUM THE DEFAULT UNIT IS M2)	2.5	KPZ	NO
FDC	1	FDC = PULSE COMPENSATION RATE	1.0	KP	YES
AGATE	1	AGATE = RADAR RANGE GATE FOR TRACK INITIATION (REFCUM THE DEFAULT UNIT IS CM)	1.	KP	YES
TGATE	1	TGATE = RANGE GATE WIDTH FOR TRACK (REFCUM THE UNIT IS CP)	.5	KP	YES
FMR(1-3)	3	FMR(1-3) = FIXED URGENT COORDINATES (RADAR MEASUREMENT ERRORS IN RAE COORD (SIGMA(1)*2*FMR(1)+2*SIGMA(2)*2*FMR(2)+2*SIGMA(3)*2*FMR(3))	500.	FT	YES
FMR	3	(REFCUM THE RADAR MEASUREMENT ERRORS IN RAE COORD (SIGMA(1)*2*FMR(1)+2*SIGMA(2)*2*FMR(2)+2*SIGMA(3)*2*FMR(3)))	.5	MRAO	YES
SNERR	3	SNERR(1-3) = S/N EXPONENT POSITION OF RADAR RADAR MEASUREMENT ERRORS IN RADAR COORD (SIGMA(1)*2*SNERR(1)+2*SIGMA(2)*2*SNERR(2)+2*SIGMA(3)*2*SNERR(3))	.8	FT	YES
		(REFCUM THE RADAR MEASUREMENT ERRORS IN RADAR COORD (SIGMA(1)*2*SNERR(1)+2*SIGMA(2)*2*SNERR(2)+2*SIGMA(3)*2*SNERR(3)))	2400.	MRAO	YES
		(REFCUM THE RADAR MEASUREMENT ERRORS IN RADAR COORD (SIGMA(1)*2*SNERR(1)+2*SIGMA(2)*2*SNERR(2)+2*SIGMA(3)*2*SNERR(3)))	15.	MRAO	YES

3. OBJECT DATA

- AS MENTIONED IN SECTION 2, ABOVE, THE USER CAN INPUT EITHER CURRENT COORDINATES (RIGHT-SUITABLE EQU-ATM) OR THE OBJECT TRAJECTORY (FOR EXC-ATM ATM PROBLEMS) OR THE OBJECT COORDINATES (FOR EXC-PROBLEMS). THE USER MUST SELECT EITHER THE OPTION OR THE OTHER (OBJECT COORDINATES OR TRAJECTORY DEFINITION).
- (1) TO ENTER CURRENT COORDINATES, SET OBJECT REFEREE
 - (1) TO ENTER CURRENT COORDINATES, SET OBJECT REFEREE ATW, CEG, GCEG-1 (FROM A RADAR PROFILE), AND CEG-REF-OBJECT (FROM AN OPTICS PROFILE) AND ENTER COORDINATES.
 - (2) TO ENTER THE VECTORS AND CIVIL VECTORS, SET CIVIL REFEREE
 - (3) TO ENTER AN OBJECT TRAJECTORY, SET CIVIL REFEREE ANY ENTER CIVIL REFEREE, AND A TIME.
- NOTE THAT ONLY ONE OBJECT STATE OR ONE TRAJECTORY CAN BE ENTERED, BUT MULTIPLE OBJECTS (RADAR) EQUALLY SPACED IN TIME (INTERVALS) CAN BE SIMULATED WHEN USING THE TRAJECTORY INPUT OPTION.

DIRECTORY OF INPUT VARIABLES

Table A.1 (Continued)

INPUT
AC.
VARIABLE
VALUES

DESCRIPTION

				PAGE
				6
BETA	1	BETA = HY ELLIPTICAL COEFFICIENT (ALWAYS INPUT IN PSF)	DEFAULT VALUES	UNIT=RADIANS
RCS	1	RCS = RADAR CROSS SECTION OF HY (REFAULT UNIT IS CPS)		ALLO=LC
		- STATE VECTOR INPUT		
OBJREF	1	LREFEN = FLAG TO SELECT OBJECT COORDINATES AS THE BLDG 1, PCL (STL = REFERENCE) OTHERWISE FCH THE ACTORY INPUT SET = ZLRCS)	REFEN	NO
OBTAG	1	GETAG = FLAG TO SELECT A POLAR CHTICS SUBJECT IS BEING INPUT (STL = TARGET-OBJECT-1 FCH RACAR, A/C CTAKEFREF-OBJECT FH CHTICS)	REF-OBJECT	NO
OBJIM	1	CETIM = OBJECT TIME (REFAULT UNIT IS SEC)	99999.	SEC
OPOS	4	OBJCS(1-4) = OBJECT POSITION (UPPOS(1-4)=POSITION CCRC, OBPOS(4)= CCRC TIME=CEGP, LOCXYZ, CH RADAR) (INSTANCES IN KM. ANGLES IN CEG)	0. 50. 50. 70.	NO NO NO NO
OBJVEL	3	OBJVEL(1-3) = OBJECT VELOCITY IN POLAR CRCH (MAGNITUDE IN KM/S, HEADING COUNTERCLOCKWISE FROM LOCAL GEOGRAPHICAL EAST IN CEG, ELEVATION ABOVE LOCAL HORIZONTAL IN DEG)	-90. -45.	NO NO
		- TRAJECTORY INPUT		
NOBJ	1	NCHO = NUMBER OF OBJECTS ON THE TRAJECTORY	0.	NO
BOPOS	4	BCPOS(1-4) = LAUNCH (IN GEG) BURN POSITION (ACPOS(1-3)= POSITION CCRC, BCPOS(4)=CCRC TYPE--GEGR, LOCXYZ, CH RADAR) (INSTANCES IN KM, ANGLES IN CEG)	0. 105. 36. 0.	NO NO NO NO
TGPOS	4	TGPOS(1-4) = TARGET (IN IMPACT) POSITION (TGPOS(1-3)=TARGET CCRC, TGPOS(4)=CCRC TYPE--GEGR, LCCXZ, CH PACAK) (INSTANCES IN KM, ANGLES IN CEG)	0. 0. 0. 0.	NO NO NO NO
GAMA	1	GAMA = HEELING ANGLE FOR TRAJECTORY SPECIFICATION (DEFAULT UNIT IS RADIANS)	20.	CEG
TEMP	1	TEMP = IMPACT TIME FCH 1-ST HY (REFAULT UNIT IS SEC)	200.	SEC
TOELT	1	TOELT = DELTA TIME BETWEEN HVS (DEFAULT UNIT IS SEC)	20.	SEC

				PAGE
				6
		- SATCOM CODE INPUTS		
		-- TO RUN A SATCOM PROBLEM, INPUT THE FIRST SATCOM CALCULATION TIME (CTIME) TO CCCUR PRIOR TO THE PROBLEM STOP TIME (TSATCP).		
		1. RUN CONTROL		

DICTIONARY OF INPUT VARIABLES

Table A.1 (Continued)

INPUT
NAMEVARIABLE
VALUESUNIT
NAME

ALLOED

DESCRIPTION

--SUBSEQUENT SATCOM CALCULATIONS ARE PERFORMED EVERY
(CTINT) SEC.

CTIME 1 CTINT = FIRST SATCOM CALCULATION TIME (DEFAULT UNIT IS SEC)

CTINT 1 CTINT = TIME STEP FOR SAT-COM CALCULATIONS (DEFAULT UNIT IS SEC)

2. PROCESSING DATA

--FROM A MORE DETAILED DESCRIPTION OF THESE INPUTS SEE
THE RESSOC MANUAL VOL. 20.

CTYPE 1 CTYPE = SATCOM MODULATION TYPE (CAPACFSK, CR FSK)
 REGEN 1 REGEN = FLAG FOR REGENERATION OF SIGNAL AT SATELLITE (YES OR NO)
 COMT 1 COMT = FLAG FOR CURRENT FSX CALCULATION (YES OR NO)
 DTERM 1 DTERM = FLAG FOR FULLY REFINED INISTIC MODE CALCULATIONS (YES OR NO)
 ORDER 1 ORDER = ORDER OF PHASE LOOKUP (FIRST OR SECOND)

3. PLATFORM DATA

--RELATIVE COORDINATES CAN BE USED HERE TO ALIGN THE
COMMUNICATIONS LINKS AND EARTH REGIONS.

XPOS 4 XPOS(1-4) = TRANSmitter POSITION (XPOS(1-3)=POSITION CCORC, YPOS(4)=
 CCORC TYPE--GECKH,LCXYZ,CH HAFRAH) (CISTANCES IN KM, ANGLES
 IN DEG)

RPOS 4 RPOS(1-4) = RECEIVER POSITION (RPOS(1-3)=POSITION CCORC,RPOS(4)=
 CCORC TYPE--GECKH,LCXYZ,CH FACAH) (CISTANCES IN KM, ANGLES
 IN DEG)

SPOS 4 SPOS(1-4) = SATELLITE POSITION (SPOS(1-3)=POSITION CCORC, SPOS(4)=
 CCORC TYPE--GECKH,LCXYZ,CR RECAR) (CISTANCES IN KM, ANGLES IN DEG)

4. LINK DATA

--FIRST ENTRY IN EACH CASE REFERS TO THE UPLINK, SECOND
ENTRY TO THE DOWNLINK.

POWER	2	FCFR(1-2) = TRANSMITTER POWER (UPLINK, DOWNLINK) (DEFAULT UNIT IS WATTS)	100.	WATTS
CFREC	2	CFREC(1-2) = SATCOM FREQUENCY (UPLINK, DOWNLINK) (DEFAULT UNIT IS MHZ)	20.	MHZ
XGAIN	2	XGAIN(1-2) = TRANSMITTER GAIN (UPLINK, DOWNLINK) (DEFAULT UNIT IS RATIO (DESIREDLESS))	7400.	YES
RGAIN	2	RGAIN(1-2) = RECEIVER GAIN (UPLINK, DOWNLINK) (DEFAULT UNIT IS RATIO (PERSISTENCE))	61.	NO

DIRECTORY OF INPUT VARIABLES

Table A.1 (Continued)
INPUT
NO.
VARIABLE
VALUES

		DESCRIPTION	DEFAULT VALUES	INIT-NAME ALLOWED
B1TP	2	B1P(1-2) = BIT PTHICK (UPLINK, LOCALLINK) (DEFAULT UNIT IS SEC)	1.0E-8	SEC YES
CBAND	2	CBANC(1-2) = IF FILTER BANDWIDTH (UPLINK, CCNLINK) (DEFAULT UNIT IS Hz)	125.	MHZ YES
PBANC	2	PBAND(1-2) = PLL BANDWIDTH (UPLINK, CCNLINK) (DEFAULT UNIT IS Hz)	125.	MHZ YES
CBEAM	2	CBEAM(1-2) = TRANSMITTER BEAMWIDTH (UPLINK, DUBLINK) (DEFAULT UNIT IS RADIANS)	1.5	DEG YES
CSN	2	CSN(1-2) = SATCOM S/N THRESHOLD (UPLINK, CCNLINK) (DEFAULT UNIT IS RATIO (UNITSLESS))	15.	CB YES
			0.8	YES

E. OPTICS CODE INPUTS

--TO RUN ANY OPTICS PROBLEM THE USER MUST FIRST SET
OPTICS=REFIN

--TWO TYPES OF OPTICS PROBLEMS CAN BE SIMULATED--
(1) A SURVEILLANCE PROFILE WHERE THE STREAM IS POINTED
AT SOME REFLECTION LOCATION (UTPESURVEYFILE), OR
(2) A EARTH TRACK PROFILE WHERE A SURVEY LOCK IS
CREATED INTERNALLY AT A SPECIFIED TIME (CTVETRACK).
--IN THE FIRST CASE, THE USER PROVIDES THE FIRST LOCK
TIME (CLOCK) AND THE REFERENCE POINT (REFPT) FOR
THE LOCK DIRECTION (OR TRACK THE BLINK 1 FIREBALL)
(SEE SURVEY INPUT). IN THE SECOND CASE, THE USR INPUTS
THE ACCSTK PCSEL AND THE SURVEY POSITION (BGPOS).
IN EITHER CASE, THE USER MUST SET UP AN OPTICAL SENSOR

1. RUN COTRACK

- SURVEILLANCE OPTICS LOCKS ARE CREATED INTERNALLY EVERY
(1FTIME) SECONDS.
- OPTICS OUTPUTS ARE CONTROLLED BY THE (ORALC) PARAMETER
(1) FOR LOCALCPWINTS). BOOST TRACK MEASUREMENTS ONLY
ARE PROVIDED, AND
(2) FOR LOCALCFUV). DATA STREAM OUTPUT AS THE DETECTOR
SCANS THE FUV WILL ALSO BE PRODUCED.
- THE ECCESTK MEASUREMENTS MAY BE USED TO INITIALIZE
(IN ACC TO) A TRACK FILE BY SETTING (TFILE=REFER), AND
THESE MEASUREMENTS MAY BE NFTIED WITH RADAR DATA BY
SETTING (SNLT=TEST).

OPTICS 1 OPTICS = FLAG FOR INITIALIZING OPTICS CALCULATION (SET OPTICS=REFER

NO

TERUS

DIRECTORY OF INPUT VARIABLES

Table A.1 (Continued)

INPUT VARIABLE	NO. VALUES	DESCRIPTION	PAGE
OVTYP	1	OVTYP = OPTICS LUM TYPE (TRACK OR SURVEILANCE) (FOR CITYL-SURVEILANCE) (DEFAULT UNIT IS SEC)	9
OLOOK	1	CLOCK = TIME OF FIRST OPTICS LOOK (FOR CITYL-SURVEILANCE) (DEFAULT UNIT IS SEC)	9
FTIME	1	FTIME = FRAME TIME FOR OPTICS LOOKS (DEFAULT UNIT IS SEC)	9
OCALC	1	OCALC = OPTICS CALCULATION TYPE (PCNTS ON FOV)	9
TFILE	1	TFILE = OPTICAL TRACK FILE FLAG (TRUE=REFER TO TRACK FILE, FALSE=ZEROS FOR IC TRACK FILE)	9
SNET	1	SNET = SENSOR NETTING FLAG (TRUE OR FALSE)	9
SENSPT	1	SENSPT = TYPE OF TARGET SENSOR IS PLACED ICARD. USE HEF FOR A FIXED POINT (HEFP1). FIREBALL TO TRACK THE FIREBALL OF BLASTS. NOTE THAT LS1 MUST ALSO SET REFER=REFER AND CBTAGREF=OBJECT. SEE SECTION C.3 ABOVE.	9
REFPT(1-4)	4	REFPT(1-4) = REFERENCE POINT FOR SENSOR POSITION (HEFP1(1-3)=POSITION COORD, HEFP1(4)=CCNU. TFILE = GEGR, LOCXY. ON RADAR) (INSTANCES IN TFILE)	9

2. SENSOR DATA

--THE SENSOR LOCATION CAN BE INPUT IN GEOGRAPHICAL COORDINATES (GEGR) OR RELATIVE TO THE REFERENCE LOCATION IN SECTION A. ABOVE.
--THERE ARE TWO AVAILABILITY BANDS ALLOCATED AND THREE BUILT IN SURVEILANCE MODELS. THE FIRST TWO MODELS SHOULD BE USED IN SURVEILANCE APPLICATIONS AND PROVIDE SLIGHTLY DIFFERENT OUTPUT. THE THIRD MODEL (SURVEIL-04) PROVIDES TRACK MEASUREMENT OUTPUT AND SHOULD BE USED WHEN (TFILE=HEFLH).

SNPOS	4	FOR OPTICAL SENSOR POSITION (SNPOS1(1-3)=POSITION, COORD, ANGLES IN DEG)	35747.	NO
MLC	2	MLC(1-2) = LOW END OF SURVEIL WAVELENGTH BAND -- (TWO BANDS ALLOWED) MLC(1-2) = (DEFAULT UNIT IS CM)	-79.33 47.75	NO
MHI	2	MHI(1-2) = HIGH END OF SURVEIL WAVELENGTH BAND (DEFAULT UNIT IS CM)	2.5L-6 2.6L-6	NO
OFERR	2	OFERR(1-2) = FIXE POSITION OF OPTICS RANCON MEASUREMENT ERRORS IN AE COORD (DEFAULT UNIT IS MARS)	2.7E-6 .01	YES MRAD
OSMER	2	OSMER(1-2) = S/N DEPENDENT POSITION OF OPTICS RANCON MEASUREMENT ERRORS IN AC CCNU (DEFAULT UNIT IS RADIAN)	.01 .01	YES MRAD
ONRDL	1	ONRDL = OPTICAL SENSOR PROCESSING MODEL -- (SURVFIL=01, SURVEIL=02, OR SURVEIL=04)	1.	YES MRAD NO

3. BOOSTER DATA

--TWO BOOSTER STAGES ARE ALLOWED. NOTE THAT THE TIME CORRESP. TO THE INITIAL BOOSTER STATE IS SET INTERNALLY TO 0. SEC AND THE AV IMPACT TIME SPECIFIED IN THE

DIRECTORY OF INPUT VARIABLES
Table A.1 (Continued)
INPUT
NO.
VARIABLE
VALUES

		DESCRIPTION	DEFAULT VALUES	INPUT-HARF ALLOWED
TRAJECTORY INPUTS (SEE SECTION C.3) WILL BE ADJUSTED ACCORDINGLY.				
FUEL	2	FUEL(1-2) = FUEL TYPE (LIGUID OR SOLID)--NOTE--TWO STAGES ALLOWED	LIGUID	NO
THRST	2	THRST(1-2) = BOOSTER STAGE THRUST (DEFAULT UNIT IS GM)	1100000.	LB YES
ATI	2	ATI(1-2) = INITIAL STAGE WEIGHT (DEFAULT UNIT IS GM)	135000.	LB YES
ATF	2	ATF(1-2) = FINAL STAGE WEIGHT (DEFAULT UNIT IS GM)	70000.	LB YES
AN02	2	AN02(1-2) = NOZZLE EXIT AREA (DEFAULT UNIT IS CMSQ)	20000.	LB YES
FTURN	2	FTURN(1-2) = STAGE BURN TIME (DEFAULT UNIT IS SEC)	35000.	LB YES
REFA	2	REFA(1-2) = REFERENCE AREA FOR AERODYNAMIC CRAG CALCULATION (DEFAULT UNIT IS CMSQ)	8000.	LB YES
CX0	2	CX0(1-2) = AXIAL FORCE COEFFICIENT AT M=0.5	3000.	INSA YES
CX1	2	CX1(1-2) = AXIAL FORCE COEFFICIENT FOR M>1.0	2000.	INSC YES
CX2	2	CX2(1-2) = AXIAL FORCE COEFFICIENT FOR M>3.0	0.	SEC YES

DESCRIPTION OF USER INPUT AND COMMAND FORMATS . . .

Table A.1 (Concluded)

THE BASIC FORM FOR EACH INPUT LINE IS . . .

11.12.13.

(ALL BLANKS ON THE LINE ARE IGNORED)
WHERE THE 11, 12, ETC. ARE EITHER COMMANDS OR ITEMS OF THE FORM . . .

ITEM=LIST

WHERE ITEM IS ONE OF THE INPUT VARIABLE, OR VECTOR ELEMENTS AND
LIST IS A LIST OF ONE OR MORE VALUES TO BE INPUT, STARTING AT THE
NAMED ELEMENT. THE VALUES NEED NOT INCLUDE DECIMAL POINTS FOR
WHOLE NUMBERS AND MAY BE APPENDED WITH APPROPRIATE UNIT NAMES IF
ALLOWED FOR THAT VARIABLE. VALUES ARE SEPARATED BY COMMAS.

THE RECOGNIZED COMMANDS ARE . . .

ABORT	CLOSES PROGRAM ABRT WITH NO OUTPUT FILE (TC AVAIL SUBMITTING A BATCH JOB)
CHANGELISTON	Turns on substitution list option (shows how values are used in RSCOE input deck)
CHANGELISTOFF	Turns change list option off
HELP	To process this menu again
RUN	Terminates execution and processes output file for RSCOE execution. Alternate forms are END or END DATA

TABLE A.2

ALLOWABLE UNIT NAMES

<u>Category</u>	<u>Unit Name</u>	<u>Scaling Factor to Internal (Default) Units</u>
Frequency	MHZ	1,000,000
	KHZ	1,000
Time	HRS	1 (This may only be used for time-of-day inputs)
	SEC	1
Mass	KG	1,000
	GM	1
	LB	453.592
Ballistic Coeff.	PSF	0.4882405
	GM/CMSQ	1
Length	CM	1
	FT	30.48
	KM	100,000
	NMI or NM	185,325
	M	100
	KFT	30,480
Acceleration	G	980.665
Area	CMSQ	1
	MSQ	10,000
	INSQ	6.4516
	FTSQ	929.0304

TABLE A.2 (Cont'd.)

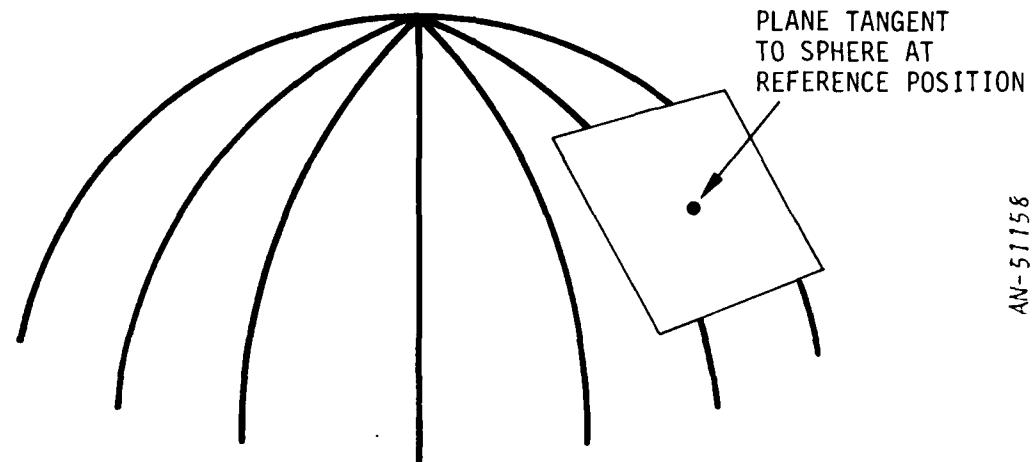
ALLOWABLE UNIT NAMES

<u>Category</u>	<u>Unit Name</u>	<u>Scaling Factor to Internal (Default) Units</u>
Yield	MT	1
	KT	0.001
Radar Range/Standard Target	CMSQCM	1
	KMSQM	10,000
	NMSQM	18532.5
	KFSQM	3048
Power	WATTS	10,000,000
Power Ratio	DB	X dB \rightarrow 10 ^{X/10}
Angle	DEG	0.01745329252
	RAD	1
	MRAD	0.001

TABLE A.3

POSITION COORDINATE SPECIFICATIONS

GEOGR	Geographical Coordinates: <ul style="list-style-type: none">• Altitude (KM)• East longitude (DEG) (longitudes west of Greenwich input as negative)• North latitude (DEG) (south latitudes negative)
LOCXYZ	Local Tangent Plane Coordinates (see Fig. A.1): <ul style="list-style-type: none">• Geographic east (KM) (west input as negative)• Geographic north (KM) (south input as negative)• Distance above plane (KM)
RADAR	Local Radar Coordinates (see Fig. A.1); <ul style="list-style-type: none">• Slant range (KM)• Azimuth (DEG) (positive CCW from east)• Elevation (DEG) (positive above horizontal)



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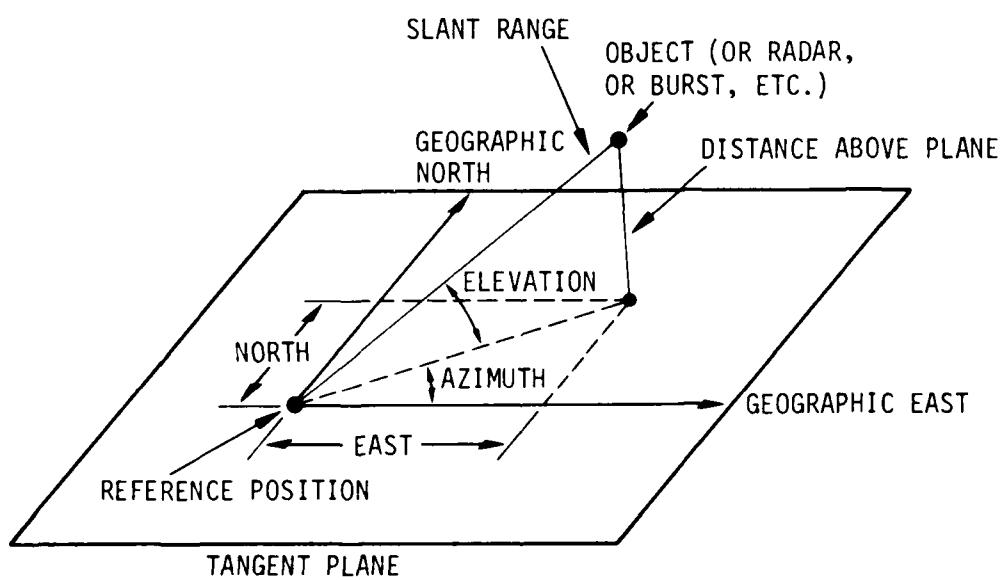


Figure A.1 Definition of Coordinates for Relative Coordinate Systems

TABLE A.4
SAMPLE CONTROL CARD DECK FOR AFWL/NOS/BEL

JOB CARD
ACCOUNT CARD
MAP(OFF)
ATTACH(XX1,0BINARY, ID=GRCXJUB,CY=1)
COPYBK(XX1,0BIN,240)
ATTACH(XX2,0BINARY, ID=GRCXJUB,CY=2)
COPYSF(XX2,0BIN)
RETURN(XX1,XX2)
REWIND(OBIN)
ATTACH(BCPYL,BCPYLROSCL, ID=GRCXJUB,CY=3)
ATTACH(STRUCT,STRUCT, ID=GRCXJUB)
UPDATE(P=STRUCT,F,D,B,C=TAPL1,L=1)
BCPYL(TAPL1,GBIN,LFILE,,REAL1,REWIND,ERRORS)
RETURN(TAPE1,TAPE4,BCPYL,0BIN)
ATTACH(SPIRE,SPINEROSCUE, ID=GRCXJUB,CY=2,NR=1)
ATTACH(TAPE1,TAPE2,TAPE3,TAPE4,TAPL5,TAPL6,BCPYL,0BIN,CY=3)
SPIRE(,,TAPL5,,,,ATL,REWIND)
ATTACH(RLIBE,RLIBEROSCUE, ID=GRCXJUB)
RETURN(TAPE1,TAPE2,TAPE3,TAPE4,TAPL5,TAPL6)
ATTACH(ANALGM8,ANALGM8ROSCL, ID=GRCXJUB)
ANALGM8.
RETURN(ANALGM8)
LOSET(LIB=RLIBE,PRESET=ZERO,FILES=TAPL1)
LOAD(LFILE)
NOGO.
RETURN(LFILE)
RETURN(RLIBE)
ATTACH(TAPE3,NEWCATROSCUE, ID=GRCXJUB)
SENDER.
7-8-9 CARD
*IDENT QCHG
*COMPILE STRUCT
ANY MOUS TO STRUCT FILE GO HERE
7-8-9 CARD
CHANGE LIST CN (OPTIONAL)
SPINE DATA INPUTS
•
•
RUN
7-8-9 CARD
6-7-8-9 CARD

TABLE A.5

SAMPLE PROCEDURE PERMFILE FOR INTERACTIVE USE

```
.PROC,ROSCOTS
COPYCR(ROSCOTS,DATAIK,2)
ATTACH(SPIRE,SHINEROSCOL,ID=GRCXJJB,CY=2,MH=1)
ATTACH(CTAB,DATA1ROSCOL,ID=GRCXJJB,CY=5)
SPIRE.
RETURN(SPIRE,INTAE,WAFILL)
ZAP(INTAE,WW,INT)
COMMENT. FILE HAS BEEN BATCHED TO INPUT.
7-8-9 CARD
JOB CARD * * * *
ACCOUNT CARD * * * *
MAP(OFF)
ATTACH(XX1,CBINRY,ID=GRCXJJB,CY=1)
COPYBR(XX1,CBIN,<40)
ATTACH(XX2,CBINRY,ID=GRCXJJB,CY=2)
COPYBF(XX2,CBIN)
RETURN(XX1,XX2)
REWIND(GLIN)
ATTACH(FCPYL,BCPYLRUSCOL,ID=GRCXJJB,CY=3)
ATTACH(STRUCT,USTRUCT,1D=GRCXJJB)
UPDATE(P=STRUCT,F=0,R,L=TAPE1,L=1)
BCPYL(TAPE1,0BIN,LFILE,,READ1,REWIND,ERRORS)
RETURN(TAPE1,TAPE4,BCPYL,0BIN)
COPYCR(INPUT,INDATA)
REWIND(INDATA)
ATTACH(RLIBE,RLIBEROSCOL,1D=GRCXJJB)
RETURN(TAPE1,TAPE2,TAPE3,TAPE4,TAPE5,TAPE6)
ATTACH(AMALGM8,AMALGM8RUSCOL,1D=GRCXJJB)
AMALGM8.
RETURN(AMALGM8)
LOAD(LFILE)
NOGU.
RETURN(LFILE)
RETURN(RLIBE)
ATTACH(TAPES,NEWLATROSCOL,1D=GRCXJJB)
SENSEL.
7-8-9 CARD
*IDENT SONG
*COMPILE STRUCT
ANY MOUS TO OSSTRUCT FILE GO HERE * * * *
7-8-9 CARD
6-7-8-9 CARD
```

TABLE A.6
TIME-SHARE INPUTS
(Underlined portions typed by User)

1. COMMAND - ATTACH (ROSCOTS, ID = GRCXJJB)

2. COMMAND - RØSCØTS

3. INPUTS? (USER TYPES IN INPUTS)

INPUTS? (USER TYPES IN INPUTS)

. . .
. . .
. . .

[ERRORS - (--IF THERE ARE INPUT ERRORS, RØSCØTS LISTS
THEM HERE AND REQUESTS INPUTS AGAIN)]

INPUTS? RUN

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